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European capital market integration: An empirical study based on a European asset pricing model

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ABSTRACT

This paper investigates the integration between the capital markets of 15 European countries, all of which are members of the European Union. Integration is tested under the joint hypothesis of a European multifactor asset pricing model. A European portfolio is constructed from which common factors are extracted using maximum likelihood factor analysis. Empirical tests are undertaken to determine whether these European factors are not only priced, but also equally priced across the European capital markets. The results show that a number of common factors are extracted from the European portfolio and a degree of capital market integration is shown to exist across the European capital markets.

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1. Introduction

This paper examines whether the capital markets of the European countries that form the European Union are integrated. Over the years there has been a continuing process of integration within the European Union. Events such as the harmonisation of monetary and fiscal policy, none more so than the introduction of the Euro, have seen the capital markets of the countries of the European Union become more integrated. From the point of view of investors, looking to create international portfolios by investing in different European markets, so as to benefit primarily from international diversification by reducing country specific systematic risk, greater capital market integration will reduce, and may even eventually remove such benefits. Perfect integration across European capital markets would imply that these capital markets share the same risk–return relationship, thus securities would be

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priced according to the same asset pricing model. To test for integration, in terms of examining the risk–return relationship between countries, an asset pricing model is required. The pricing model adopted in this paper assumes that securities are priced according to a European multifactor asset pricing model. Assuming this, then integration across the European capital markets would imply that a security's expected return should be directly related to its sensitivity to European risk factors.

Different methodologies have been adopted in studying capital market integration. One such methodology is the use of multivariate cointegration techniques. Corhay et al. (1993) found evidence of one cointegrating vector on examining five European capital markets. A study by Chung and Lui (1994) found two cointegration vectors on examining the capital markets of the US, Japan, Taiwan, Hong Kong, Singapore and South Korea. A more recent study by Chen et al. (2002) found evidence of one integrating vector on examining the South American capital markets of Argentina, Brazil, Chile, Columbia, Mexico and Venezuela. Pascal (2003) examining long-run comovements in the UK, French and German capital markets found no evidence of an increasing number of cointegrating vectors.

Asset pricing models, both single and multifactor, have been applied so as to examine capital market integration. Single factor models such as the international CAPM examines whether security risk can be explained by the covariance of national returns with an international portfolio. The results from testing for integration using a single risk factor model have been somewhat mixed. Solnik (1977) found evidence of a degree of integration between US and European countries, and Stehle (1977) showed that the pricing of US securities was significantly related to a global market portfolio. Studies by Stulz (1981) and Alder and Dumans (1983) provided evidence in support of an international CAPM, whereas Jorion and Schwartz (1985) however found little evidence of integration between the Canadian and US markets. Empirical studies to date adopting a multifactor asset pricing model to examine integration across various capital markets have also produced mixed results. Studies by Gultekin et al. (1989) examining the stock markets of the US and Japan, Korajczyk and Viallet (1989) examining the stock markets of the US, Japan, France and the UK, and Vo and Daly (2005) on examining the European equity markets, all failed to find any strong evidence of integration across these markets. Studies however by Heston et al. (1995) on the capital markets of Europe and the USA, Cheng (1998) examining the capital markets of the UK and USA, and Swanson (2003) examining Japan, Germany and the USA, all produced evidence in support of integration across these markets.

In this paper integration between the European capital markets is examined under the context of a European multifactor asset pricing model. Applying a European pricing model itself implies that the capital markets of Europe are integrated, thus the joint hypothesis problem exists. The application of a European multifactor asset pricing model assumes that returns follow a k-factor structure.[1] The k-factor structure represents a number of common factors that explain the underlying correlations between security returns across different markets. Clearly, the greater the correlation the greater the integration. Various studies have examined correlations between different markets in an attempt to identify integration across global markets. Studies by Daly (2003) found, on examining the Asian markets, increased correlation after the stock market crash of 1997. Adjaoute and Danthine (2002) and Hardouvelis et al. (1999) found evidence of correlation between the European markets.

This paper examines capital market integration across 15 European countries all of which form part of the European Union. The countries include: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, The Netherlands and the UK. The question of integration is examined by testing a European multifactor pricing model. The analysis involves extracting common factors from a European portfolio which is made up of a combined subsample of securities from each of the European countries. The technique of maximum likelihood factor analysis is adopted to extract common factors so as to determine the European factor structure. Once the factor structure is known, factor scores are subsequently estimated based on the methods of; Thurston (1935), Bartlett (1937) and Anderson and Rubin (1956), and are then adopted to test the validity of the European multifactor asset pricing model. Are the European factors priced, in the sense that there is a risk premium associated with them, and is this risk premium the same across all European countries.

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[1] Multifactor asset pricing models assume that the return on a security can be explained by common systematic risk factors (see the Arbitrage Pricing Theory of Ross (1976, 1977)).